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Arthur and Marilouise Kroker, Editors

1000 Years of War:

CTHEORY Interview with Manuel De Landa

Manuel De Landa in conversation with: [Don Ihde](#), [Casper Bruun Jensen](#), [Jari Friis Jorgensen](#), [Srikanth Mallavarapu](#), [Eduardo Mendieta](#), [John Mix](#), [John Protevi](#), and [Evan Selinger](#).

Manuel De Landa, distinguished philosopher and principal figure in the "new materialism" that has been emerging as a result of interest in Deleuze and Guattari, currently teaches at Columbia University. Because his research into "morphogenesis" -- the production of stable structures out of material flows -- extends into the domains of architecture, biology, economics, history, geology, linguistics, physics, and technology, his outlook has been of great interest to theorists across the disciplines. His latest book on Deleuze's realist ontology, *Intensive Science and Virtual Philosophy* (2002), comes in the wake of best-sellers: *War in the Age of Intelligent Machines* (1991), where De Landa assumes the persona of the "robot historian" to bring the natural and social sciences into dialogue vis-à-vis using insights found in nonlinear dynamics to analyze the role of information technology in military history, and *A Thousand Years of Non-Linear History* (1997), where he carves out a space for geological, organic, and linguistic materials to "have their say" in narrating the different ways that a single matter-energy undergoes phase transitions of various kinds, resulting in the production of the semi-stable structures that are constitutive of the natural and social worlds. When Evan Selinger gathered together the participants for the following interview, his initial intention was to create an interdisciplinary dialogue about the latest book. In light of current world events -- which have brought about a renewed fascination with De Landa's thoughts on warfare -- and in light of the different participant interests, an unintended outcome came about. A synoptic and fruitful conversation occurred that traverses aspects of De Landa's oeuvre.

I. War, Markets & Models

CTHEORY (Mendieta): In these times of "a war against terrorism," and preparing against "bioterrorism" and "germ warfare," do you not find it interesting, telling, and ironic in a dark and cynical way that it is the Western, Industrialized nations that are waging a form of biological terrorism, sanctioned and masked by legal regulations imposed by the WTO and its legal codes, like Intellectual Property Rights (IPR). Would you agree that the imposition of GMO -- genetically modified organism -- through WTO, NAFTA, and IMF, on the so-called developing world is a form of "legalized biotech and biological" terrorism? And then, as a corollary, what are the prospects for global justice and equity in light precisely of the yawning gap between developed and underdeveloped nations that is further deepened by the asymmetrical access to

technologies like genetic engineering and genomic mapping?

Manuel De Landa: Though I understand what you are getting at I do not think it is very useful to use this label (biological terrorism) for this phenomenon. The point, however, is well taken. The way in which corporations are encroaching around the most sensitive points of the food chain is dangerous: they direct the evolution of new crops from the processing end, disregarding nutritional properties if they conflict with industrial ones; the same corporations which own oil (and hence fertilizers and herbicides) also own seed companies and other key inputs to farming; and those same corporations are now transferring genes from one species to another in perverse ways (genes for herbicide resistance transferred from weeds to crops). When one couples these kind of facts with the old ones about the link between colonialism and the conversion of many world areas into food supply zones for Europe (from the creation of sugar plantations to the taking over of the photosynthetically most active areas of the world by Europe's ex-colonies) we can realize that this state of affairs does have consequences for equity and justice. The key point is not to oversimplify: the Green Revolution, for example, failed not because of the biological aspect, but because of the economic one: the very real biological benefits (plants bred to have more edible biomass) could only be realized under economies of scale and these have many hidden costs (power concentration, deskilling of workforce) which can offset the purely technical benefits.

The question of Intellectual Property rights is also complex. We should be very careful how we deal with this, particularly considering many of us bring old moral clichés ("private property is theft") into the debate without being aware of it. I believe this issue needs to be handled case by case (to solve the inherent conflict between lack of accessibility and incentive to create). For example, I am completely opposed to the patenting of genes but not of gene products, like proteins.

CTHEORY (Mix): In *War in the Age of Intelligent Machines* you discuss the German *Blitzkrieg* of WWII in relation to a synergistic tactic that unified air and ground troops. If we return to this time period, it becomes noteworthy to highlight that the synergy fell apart when the machinery, specifically the ground forces (i.e. tanks, jeeps, personnel transports, etc.) broke down and the soldiers manning them could not get them operational, and were forced to get mechanics to do the repairs, or else hope that the supply lines were kept open to bring in replacement vehicles. By contrast, many of the American G.I.s were "grease monkeys" and could easily repair their own vehicles. Since many of the components of the ground vehicles were interchangeable, they could scavenge usable pieces from damaged equipment, therein being able to fix problems on the spot and remain operationally mechanized. My question is: Because contemporary military technology is built on principles that the average G.I. is not familiar with (i.e. the compatibility between the standard engine and military ground vehicles no longer exists), do you think that the benefits of the war machine will be outstripped by the lack of serviceability that probably will arise in the field under combat conditions? Do you think that we should be training our soldiers differently or do you think that we should modify the technologies they use?

De Landa: One of the themes of the *War* book was the tendency of military organizations to get "humans out of the loop." Throughout the book (and in my only live lecture to the military) I have very strongly criticized this, urging for the lowering of decision-making thresholds so that soldiers in the field with access to real time information have more power to make decisions than their superiors at the Pentagon. (This theme, of course, goes beyond the military to any kind of centralized decision-making situation, including economic planning.) The problem you raise is, I believe, related to this. If all technological decisions are made centrally without thinking of issues of maintenance in the field, and if there is no incentive for field soldiers to

become "grease monkeys" or "hackers," the army that results is all the more brittle for that. Flexibility implies that knowledge and know-how are not monopolized by central planners but exist in a more decentralized form.

CTHEORY (Protevi): *War in the Age of Intelligent Machines* came out in 1991, just at the time of Operation Desert Storm. Do you see any noteworthy developments in the integration of information technology and artificial intelligence into US security / military operations from the time of Desert Storm, through Afghanistan and the Second Gulf War? I have two particular areas I would ask you to comment on: (1) developments in what you call the Panspectron in surveillance; and (2) the use of the robot drone plane to kill 6 suspected al-Qaida members in Yemen: is this a decisive step forward in your history of the development of autonomous killer machines, or is it just more of the same, that is, AI as an adjunct, without true executive capabilities? Finally, do you see any utility to the claim (a variation on the old "technological imperative" idea) that, among many other factors in the Bush Administration, certain elements of the Pentagon support the war campaign as providing a testing ground for their new weapons systems?

De Landa: I do not see the threshold I warned against (the emergence of predatory machines) as having been crossed yet. The drone plane was being remotely guided, wasn't it? At the level of surveillance I also fail to see any dramatic development other than a quantitative increase in computing power. What has changed is the direction that the migration of "intelligence" into weapons has taken, from the creation of very expensive smart bombs to the use of GPS-based cheap equipment that can be added to existing dumb bombs.

I am not sure the Pentagon has a hidden agenda for testing their new weapons but I do think that it has been itching for a war against Iraq for years before 9-11, in a similar way they were itching for one during the Cuban missile crisis in the 60's. It was tough for Kennedy to resist them then, and so Bush had very little chance to do it particularly because he has his own family scores to settle.

CTHEORY (Mix): Medieval archers occupied the lowest rung of the military hierarchy. They were looked down upon and thought of as completely expendable, not only because the archers were mostly untrained peasants, but also in part because the equipment they used was quite ineffectual. At the level of military ethos, one could say that the archer lacked the romantic stature of the knight because their style of combat was predicated on spatial distance -- shooting from far away seemed cowardly, whereas face-to-face sword combat had an aura of honor to it. The situation changed for the English, however, due to the introduction of the long bow (a development that was materially dependent on the availability of the wood in the region, the yew trees). Years of training were invested in teaching the English archers to use this weapon with deadly effectiveness. Consequently, their stature increased, and for the first time, pride could be taken in being an archer. Today, some critics charge that using unmanned drones is cowardly because it involves striking at a distance. We can thus see the situation as somewhat analogous to the arrow let loose by the Medieval archer. My question is: Will the drones let loose by servicemen ever lose their stigma in the same way as the English archers did? Clearly, the drones like the English archers proved to be successful in battle. And yet, the image of the drone controlled by a serviceman does not evoke the same humanity as the embodied Englishman.

De Landa: I agree that in military history questions of "honor" have always influenced decisions to adopt a particular weapon. And distance per se was not always the main reason: early rifles were not particularly liked due to their increased precision, and the practices this led to (the

emergence of snipers) were seen as dishonorable. Yet, once Napoleon had changed the paradigm from battles of attrition to battles of annihilation harassing the enemy via snipers became quite acceptable. Even more problematic was the effect of the rifle and the conoidal bullet in changing traditional hierarchies as infantry could now defeat artillery, forcing the latter to hide behind defensive positions (a hiding which must have carried a bit of stigma at first but that went away fast). I think the use of drones will only be seen as problematic from the "honor" point of view for a very short time.

CTHEORY (Mallavarapu): In your work you challenge anthropomorphic and anthropocentric versions of history. What implications does this have for politics in an increasingly militarized world? More specifically, is there a danger of the idea of self-organizing systems being used to justify and celebrate increasing militarization and the growth of so-called "free market" economies?

De Landa: I'll begin with the latter. Theories of self-organization are in fact being used to explain what Adam Smith left unexplained: how the invisible hand is supposed to work. From a mere assumption of optimality at equilibrium we now have a better description of what markets do: they take advantage of decentralized dynamics to make use of local information (the information possessed by buyers and sellers). These markets are not optimizing since self-organizing dynamics may go through cycles of boom and bust. Only under the assumption of optimality and equilibrium can we say "the State should not interfere with the Market." The other assumption (of contingent self-organization) has plenty of room for governments to intervene. And more importantly, the local information version (due to Hayek and Simon) does not apply to large corporations, where strategic thinking (as modeled by game theory) is the key. So, far from justifying liberal assumptions the new view problematizes markets. (Let's also remember that enemies of markets, such as Marx, bought the equilibrium assumption completely: in his book *Capital* he can figure out the "socially necessary labor time," and hence calculate the rate of exploitation, only if profits are at equilibrium). Now, the new view of markets stresses their decentralization (hence corporations do not belong there), and this can hardly justify globalization which is mostly a result of corporations. And similarly for warfare, the danger begins when the people who do not go to war (the central planners) get to make the decisions. The soldiers who do the actual killing and dying are never as careless as that.

CTHEORY (Selinger): On a number of occasions, we have discussed different aspects of computer modeling. In fact, you just brought up the topic of modeling in connection with war-games. I remain unclear on the following. To what extent should we use evidence from computer modeling in artificial societies to get us to rethink traditional notions about human behavior? For example, the standard metaphor that used is to think about mass violence is contagion; this is because the violence seems to spread so quickly from person to person and neighborhood to neighborhood. Yet, Joshua Epstein's simulation of artificial genocide suggests that the view that a collective mind (or some sort of infectious hysteria) underlies mass violence is illusory, perhaps even folk psychological. Specifically, his work suggests that the origin of genocide might be a series of individual decisions whereby people turn violent as a result of their responses to local conditions. Thoughts?

De Landa: All models, by definition, simplify things. Contagion models can be very useful to study certain propagation effects, whether these are fads, fashions or ideas. Can they also be useful to study the propagation of affect? We can't tell in advance. What is important to see is that even if they turn out to be useless to study violence that does not affect their usefulness in other areas. Also, contagion models differ in the detail with which they portray agency, from completely mechanical models with no agency at all (a homogeneously socialized population) to

models in which some form of virtual agent is included. But the key problem is that no one agrees what agency is: must it include some form of rational choice, and if so optimizing or satisfying rationality? Should all psychological effects be eliminated and only inter-subjective effects taken into account? How socialized and obedient should we assume agents to be, and should these qualities be modeled as homogeneously or heterogeneously distributed? Most of these issues have nothing to do with computers and will haunt any modeling effort however informal.

CTHEORY (Selinger): You have often questioned what is at stake, socially, politically, and conceptually, when intellectuals engage in criticism. Simply put, you are all too aware of the ease by which putatively "Critical Theorists" are easily swayed by dogmatic convictions and too readily cognitively stymied by uncritical presuppositions. One might even say that in so far as you characterize yourself as a philosopher -- even if in the qualified sense of a "street philosopher" who lacks official credentials -- you believe that it is the duty of a philosopher to be critical. By contrast, some of the more avant-garde STS theorists seem -- albeit perhaps only polemically and rhetorically -- to eschew criticism. For example, Bruno Latour's latest writings center on his rejection of criticism as an outdated mode of thought that he associates with iconoclasm. He clearly sets the tone for this position in *We Have Never Been Modern* in connection with acknowledging his intellectual debt to Michel Serres, and he emphasizes it in *Pandora's Hope*, *War of the Worlds*, and *Iconoclasm*. Succinctly put, Latour claims that for six reasons ideology critique (which he implicitly associates with normative critique as such) is a faulty and patronizing form of analysis: (1) ideology critique fails to accurately capture how, why, and when power is abused, (2) ideology critique distorts how authority comes to be overly esteemed, (3) ideology critique imputes "extravagant beliefs" onto whatever group is taken to be oppressed, (4) ideology critique leaves the group that is perceived to be oppressed without adequate grounds for liberation, (5) ideology critique distorts the relation between critic and the object of criticism, and (6) ideology critique accusatively "destroys a way of arguing." What do you think of this position?

De Landa: First of all, I agree that the labels "critical" and "radical" have been overused. In the last analysis one should never apply these labels to oneself and wait for history to decide just how critical or radical one's work really was (once its consequences have been played out). Latour's problem seems to be more with the concept of "ideology" than that of "critique," and in that I completely agree: to reduce the effects of power to those of creating a false consciousness is wrong. But here is where the real problem is, since one cannot just critique the concept of "ideology," the real test of one's radicality is what one puts in its place. Or, to put it differently, how one re-conceptualizes power. And here one's ontological commitments make all the difference in the world. Can a realist like myself trust a theory of power proposed by a non-realist, for example? Can a realist ever believe in a theory of power developed, for example, by an ethnomethodologist, when one is aware that for that person everything is reducible to phenomenological experience? The same point applies to normativity: if one is a realist defending a particular stance will depend on developing a new ethics, not just critiquing old moralities. Here a Spinozian ethics of assemblages that may be mutually enhancing versus those that are degrading may be the solution, but developing this idea will also imply certain ontological commitments (to the mind-independent reality of food and poison, for example).

CTHEORY (Jensen): A similar question could be raised in relation to your work on markets and anti-markets. In contrast to *Empire* by Hardt and Negri, which explicitly hopes to have a political impact, your position is much less straightforwardly normative. If, in a realist vein, you take your analysis to be descriptive, how then do you think people might act to reap the benefits of your description?

De Landa: No, not at all. Remember first of all that a realist never settles for a mere description. It is explanation that is the key and the latter involves thinking about real mechanisms which may not be directly observable (or describable). The disagreement with *Empire* is over the mechanisms one postulates and the details of their workings. I do not accept the Marxist version of these mechanisms (neither those through which markets are supposed to operate nor those for the State) and believe the Marxist version leads to practical dead ends regardless of how ready to be used in social interventions the analysis seems to be. (To be blunt, any idea for social intervention based on Marxism will be a failure). I do take normative positions in my books (such that decentralization is more desirable than centralization for many reasons) but I also realize that in an ethics of nourishing versus degrading assemblages real-life experimentation (not *a priori* theorization) is the key. To use an obvious example from environmental ethics: a little phosphorous feeds the soil; too much poisons it. Where exactly the threshold is varies with type of soil so it cannot be known *a priori*. But the normative statement "do not poison the soil" is there nevertheless. Similarly for society: too much centralization poisons (by concentrating power and privilege; by allowing corruption; by taking away skills from routinized command-followers etc) but exactly how much is to be decided by social experiments, how else?

II. Competing Ideologies & Social Alliances

CTHEORY (Protevi): *A Thousand Years of Nonlinear History* (1997) and your talk "A New Ontology for the Social Sciences" (2002) propose a "nested set" of individual entities in a "flat ontology." Like all your works, both pieces use nonlinear dynamical concepts to discuss the morphogenesis of these individuals. However, your social ontologies seem largely to begin with adults as their lowest level, notwithstanding some mention of children in the section on linguistics in *A Thousand Years of Non-Linear History* (norm-learning and creolization). Do you avoid discussing child development, about which a lot of research has been done using nonlinear dynamics in studying brain development, motor learning, and so forth, simply for space and time constraints, or is there another reason? Would you agree that adding such discussions would be useful in demonstrating several areas of interlocking top-down constraint by family, institutional, civic, national, and perhaps even larger units?

De Landa: The key to the ontology I defend is the idea that the world is made out of individual entities at different levels of scale, and that each entity is the contingent result of an individuation process. Clearly, and despite the fact that I have ignored it so far, the individuation of a social agent during childhood, and even the biological individuation of an adult organism in that same period, are two crucial processes. Without these social and biological individuations we would not be able to account for adult individuals. If I placed less emphasis on this is because through the work of Freud and Piaget (and others) we have a few models of how these processes could be conceived, but we have much less insight on how institutional organizations or cities individuate (in fact, the very problem is ignored in these two cases since both those entities are conceptualized as structures not as individuals). I will get to the questions you raise in due time, when I finally tackle the question of subjectivity. At this point in time, when everyone seems obsessed with the question of subjective experience at the expense of everything else, it seems the priorities must be reversed: account for the less familiar forms of individuation first returning to our own psyches later.

CTHEORY (Selinger): In Chapter 4 of *Intensive Science and Virtual Philosophy* you discuss the implications that acknowledging the notion of "quasi-cause" brings with regard to the debates

surrounding the D-N model of explanation. As is well-known, in the context of "modifying" and "supplementing" Hempel and Oppenheim's account, Mary Hesse argues that scientific explanation is metaphoric. Specifically, by appropriating Max Black's Interaction account of metaphor, Hesse claims that scientific explanation is a metaphoric redescription of the domain of the explanandum. In this account, it is not only metaphoric to say that "class struggle is the motor of history," but also to say that "gases are collections of randomly moving massive particles." Using the terms 'metaphor' and 'model' synonymously, one of Hesse's main points is that although scientific (unlike, she claims, poetic) metaphors must resemble what they refer to (which is why the history of science is filled with failed metaphors e.g. heat fluid or the classical wave theory of light), they are not strictly identical either. To this end, do you view the concepts you appropriate from complexity theory to be metaphors? If so, what does this mean to you?

De Landa: Well, although I do not question the idea that metaphors play a role in scientific thought I certainly do not think this role is central. In the book of mine you mention I make it very clear that a mathematical model is not just a formal version of a linguistic metaphor. Not to approach mathematics in its own right, reducing it to logic or to semiotics, seems to me the main error in most accounts of physics. (Remember that I do not believe there is such a thing as "science" in general, or a "scientific method" in general, so my remarks now apply only to physics). The key ideas of complexity theory (the ideas of "attractor" and of "symmetry-breaking bifurcation") come from real properties of mathematical models. They are not just linguistic "concepts." And more importantly, they have turned out to be properties of many different models, that is, they are independent of the specific mechanisms in which they are actualized. It is this "mechanism-independence" which makes it promising they will be useful elsewhere (in social science, for example) since this independence may be evidence of a deeper isomorphism underlying very different processes. Deleuze's conception of the "virtual" is precisely an attempt to think this underlying reality.

CTHEORY (Selinger): What, then, is your account of reference? How does it relate to Deleuze's claim in the *Logic of Sense* that: "The genius of a philosophy must first be measured by the new distribution which it imposes on beings and concepts"?

De Landa: Unlike Hesse, I'm interested in the question of how reference is established non-discursively. So instead of metaphor, topological isomorphism is more important for a Deleuzian realist. In *Difference and Repetition* Deleuze starts with Foucault's analysis of the Cartesian episteme as having four dimensions -- similarity, identity, analogy and contradiction (opposition). Deleuze sets out to create a philosophy that does not use any of these four dimensions, except as derivative concepts. He uses the concept of intensity to develop a new way of theory of difference. Deleuze is moving away from similarity -- resemblance is the enemy for him. For Deleuze, there is a virtual entity that is topological and as realists we have a commitment to it. To return to the soap bubble example -- it is an example of a single equilibrium obtained by minimizing surface tension. A salt crystal is another example obtained by the minimizing of bonding energy. Both are actualizations of the same topological point even though they have no resemblance to one another: one is a cube and the other a sphere. Topological isomorphisms are fine when we talk about soap bubbles and salt crystals, but what about society? Deleuze's book on Foucault is in my opinion the best application of these ideas to society.

CTHEORY (Mallavarapu): To ask a related question... In your introduction to *War in the Age of Intelligent Machines*, you take care to point out that your use of the idea of self-organization is "more analogical than mathematical." What are the problems and possibilities that arise from the use of analogies from chaos science to describe social phenomena?

De Landa: That remark is a disclaimer to draw attention to the fact that one does not have the legitimate right to postulate an "attractor" until one has some mathematical evidence one may be lurking there. (This, by the way, does not imply possession of a formal model. One can infer the presence of an attractor from an analysis of time series, such as those we have for production prices in economics, or voting patterns in political science). The remark in that book was to the effect that I did not model warfare either directly or through time series. That's the only way one can use these ideas non-metaphorically. (Then, of course, one has to show evidence that the actual physical or social system has an attractor by giving it a push, for example, injecting some energy or spending some money, and checking whether the system returns to its previous state after a while).

CTHEORY (lhde): I would like to raise two questions that are organized around a single theme. (1) While it is fashionable these days to be "posthuman" or anti-anthropological, I remain curious about what would motivate such moves? If the problem is that all positions imply some sort of "metaphysics" and "humanism" in a postmodern era shows its implicit humanist bias as linked to early modern epistemology, isn't a counter-move just as likely to have similar "metaphysical" tones? (2) Similarly, is a post-human position possible? and if so, what would its advantages be? It seems to me, in spite of efforts to the contrary, that even the most rigorous scientific claims imply the human since they have to be made in language and/or shown in perceivable images. (3) And, finally, while I deeply appreciate your moves to show that wholes and non-linear processes are more complex and richer than older notions of totality and linearity, isn't a move to notions of "self-organization" also just as metaphysical as earlier notions?

De Landa: First of all, the questions here are not so much "metaphysical" (a word which seems to have become an insult losing all its real content) as ontological. When one is not a realist, when one operates within an ontology of appearances, for instance, any claim about a mind-independent reality is labeled as "metaphysical" (as an insult). But of course, one can turn the insult around and call all Continental philosophy "metaphysical" as the logical positivists did. Either way it's all a waste of time. The real question is whether it is legitimate to have an "anthropocentric ontology", that is, to draw the line between the real and the non-real by what we humans can directly observe. What makes our scale of observation, in space or time, so privileged? Why should we believe in the Mississippi river (as Andrew Pickering does) but not in oxygen or carbon (as he does not)? Why should we study things in "real time" (that is, at our temporal scale) instead of at longer periods (to capture the effect of "long durations")? I have always thought the word "post-human" is very silly and never used it. It is not a matter of a "post" here, but a matter of getting rid of all the non-realist baggage that is slowing us down, such as the Humean view of causality (as observed constant conjunction) instead of thinking of causes as real relations in which one event produces another event. The fact that in order to communicate these ideas one must use language is not an excuse to retreat to an idealist ontology. At the end of the day, Pickering is not a "post-humanist." It takes guts to say that oxygen does not exist, as someone coming from the constructivist tradition like Pickering does. But then I want to know: What happens then to the table of elements and the surrounding theories that allow us to predict how oxygen behaves and manipulate it? I'm willing to concede that quarks might have a questionable epistemological status, but what about electrons? As Ian Hacking says, if we can spray them, they are real. We have proof of the electrons in front of us in the television set. Both the positivists and the constructivists who are traditionally seen as having nothing in common with one another end up somehow assuming that only the observable is the real: the Mississippi is real, while oxygen is seen as having a problematic epistemological status. The underlying problem with these positions is that they are anthropocentric; they are limited to what we can see as human observers. What about telescopes and microscopes? They open up realms to us that we cannot verify through

unmediated observation.

CTHEORY (lhde): I agree with you here that we have to take technologically mediated ways of seeing into account. In my version of instrumental realism, experience is mediated through technology. This is why I differ from my phenomenological predecessors. I am critical of the subjectivist position that limits itself to individual experience.

De Landa: I don't want to say that human experience is not real, but you cannot make it the entire context of your ontology. This is what I find happening, often implicitly, in a wide variety of theoretical positions. The question of time that Pickering raises is also significant here. Pickering advocates a "real-time" approach to studying emergence that is limited precisely because it is anthropocentric.

CTHEORY (lhde): This formulation makes Pickering seem like Bas van Fraassen, the analytic philosopher of science whose views on "constructive empiricism" limited his commitment to truth to that which is observable.

De Landa: Of course he wouldn't like to be characterized that way, but there is some truth to it. My point is that every filmmaker knows that there are non-real time phenomena. For example, shoot one frame every hour in front of a budding flower and play it back faster the next day. Or shoot hundred frames per second of a bullet hitting a target and slowing it down. A broader time scale is required which is not limited to the human time scale of observation.

CTHEORY (lhde): But doesn't the film example essentially show how time can be translated into what we can see, what is visible for us?

De Landa: Again, the point that I am trying to make is that we should not privilege the viewpoint of the human observer. We need to acknowledge that realism is about what is out there, irrespective of whether we see it or not. Deleuze is interested in exteriority and assemblages, the relationship between bodies, not individual subjectivity. Deleuze is such a daring philosopher because he creates a non-essentialist realism. Once you divorce ontology from epistemology, you cannot be an essentialist.

CTHEORY (Mallavarapu): To return to the epistemological status of oxygen, could we not tell a Latourian story of competing networks (oxygen and phlogiston), with one network (oxygen) winning over the other because it is able to mobilize a larger set of allies in a complex network including human and non-human actants? It then makes sense to say that oxygen exists on the basis of the strength of the network.

De Landa: The story of competing networks seems much more fruitful when one looks at controversial science, science which is emerging. I'm also concerned about how network theories often amount to stories of competing ideologies and social alliances, even though I'm aware that Latour does include a lot of non-human elements in his actor-network theory. Latour acknowledges Deleuzian influences on his work, but it is hard to pin down where exactly he stands with regard to Deleuzian realism. In any event, a realist would certainly not be comfortable attributing the existence of oxygen to the outcome of network interactions.

CTHEORY (Jorgensen): In light of this answer, I would like to pose two questions that bring your work further into dialogue with Latour. One of your main claims associated with this call for a new ontology is that there are no essences -- at least as traditional philosophy defines them. Rather, you insist that ontological analysis should focus on historically constituted, individual

entities that operate on different scales, but yet still interact to form wholes. To account for these emerging wholes, you argue that the interaction between the groups of individual entities has to be accounted for. To some extent, this approach resembles Latour's style of investigation, according to which the analyst is required to give an account of the different actants being studied, and their relations, in order to give an account of the network they constitute. Can you elaborate on this connection?

De Landa: The claim I make (similar to the one Roy Bhaskar makes) is that to be ontologically committed to emergent wholes is to assert that these wholes have causal powers of their own. (And these cannot be Humean causes but real causes). It is not just a matter of examining a network of interacting causal agents, but of also showing the emergent whole is a causal agent on its own. I do not know what Latour's position relative to causal relations is, but without a realist account of causality his work and mine can only be superficially related.

CTHEORY (Jorgensen): You continually stress the need to conceptualize wholes without appealing to traditional notions of totality. Indeed, you argue that the historical processes that give rise to the wholes has to be laid out by analysts who are interested in the problem of becoming. My question concerns stabilization, the moment when something becomes a whole. When something becomes a whole, such as an institution or a city, you might then say it becomes a "black box." Can you elaborate on the relation between individual entities, interaction, and emergent wholes in relation to Latour's theory of blackboxing?

De Landa: Blackboxing is something we humans do when we do not understand the mechanism through which an effect was produced, but do not wish to be bothered by that. For many purposes it is enough to understand that if something comes in as input, then we will always get this output (regardless of whether we know exactly how). Most claims in social science (to the extent that they do not specify concrete mechanisms) are of the blackbox type. So are many in the physical sciences (Newton basically blackboxed the mechanism through which gravity acts at a distance). Many scientists in their laboratories have no idea how exactly their tools work (they know the inputs and outputs only) so these tools are blackboxes. To the extent that we do not know the mechanisms through which organizations or cities operate, they are blackboxes. But as a realist, since I refuse to remain at the level of description and demand explanations, I have to open as many blackboxes as I can. I have to give accounts in terms of mechanisms. I believe that Deleuze "machinic" philosophy is partly about that: opening black boxes and understanding their inner machinery.

CTHEORY (Selinger): Getting off the topic of Latour... A few weeks ago I heard Stephen Wolfram give a lecture based on his book *A New Kind of Science*. There was a performative element to this talk which I found striking. Unlike the recent STS work on distributed cognition and distributed expertise, Wolfram reveled in depicting himself as essentially an isolated researcher who spent more time contacting historians of science and technology than current practitioners. This narrative served as the rhetorical basis for his claim to be a renegade scientist who inaugurated a paradigm shift. Have you read this recent book or any of his published material? If so, do you find his claims about cellular automata and complexity theory to correlate with unique insights on his part, or is it more the case that he is synthesizing ideas that have been well-known to researchers in the field of complexity theory for some time?

De Landa: Though I have not read his recent book, I think his claims have to be wildly exaggerated. In fact, it would seem that each famous scientists in this field would want his own theory or model to be the center of it all. Ilya Prigogine wants everything to be "order through fluctuations"; Roy Bhaskar wants it all to be about self-organized criticality (his sand piles with

fractal avalanches); Stuart Kauffman wants it all to be about "the edge of chaos", and now of course Wolfram wants it all to be about this one CA rule. To me this denies the basic insight of nonlinearity, its plurality of effects. Enrico Fermi once said that to speak of "nonlinear mathematics" made as much sense as to speak of "non-elephant zoology." In other words, the dichotomy linear-nonlinear is a false one: there are many nonlinear effects and linear ones are one special case of it (so the word nonlinear should eventually disappear). Whenever one opposes chaos and linearity one is bringing back the dichotomy. And so one does when one favors one particular phenomenon at the expense of the large variety of others. Wolfram has done very good work (classifying cellular automata, for example) and his claim to have discovered a special rule is probably serious. But so are the claims by the other scientists I just mentioned.

CTHEORY (Mix): Considering how much of your work focuses on computers, it seems appropriate to end this section by bringing up an Internet oriented question. In your essay "Markets and Anti-Markets in the World Economy" you follow Fernand Braudel in analyzing the flow of capital towards and away from "universal warehouses," defined as dominant commercial centers where one can purchase "any product from anywhere in the world." You not only note that historically cities such as Venice, Amsterdam, London, and New York have served this function, but you further suggest that we may be: (1) "witnessing the end of American supremacy" and (2) that Tokyo may be the next "core." In this age of advanced Internet use, when one can now shop for global goods and services from almost any city of origin, how important is it to think in "warehouse" terms?

De Landa: The preeminence of the cities you mention was always contingent on the speed of transport: for as long as sea transport was faster than by land, not only goods but people and ideas flowed faster and accumulated more frequently in maritime metropolises. But the advent of steam motors (and the locomotive) changed that relation, allowing landlocked capitals (such as Chicago) to become universal warehouses. Hence, any technology that changes the speed of the circulation of goods and information (the internet plus Federal Express) will have an effect like this, maybe even making cities irrelevant as accumulation centers.

**III. "I think Marxism is Deleuze and Guattari's little Oedipus, the small piece of territory they must keep to come back to at night after a wild day of deterritorializing."
(Manuel De Landa, CTHEORY Interview)**

CTHEORY (Selinger): My question here concerns your sense of the value of phenomenological analysis. Deleuze was a staunch critic of phenomenology. He saw it as a subjective style of philosophy that reduced the plane of immanence to that which appears for consciousness. However, I recently found a reference that struck me as interesting in light of your work. In order to explain to those who are not familiar with self-organizing processes how essences are created, you point to how it is not possible to explain the coming into being of the spherical form of a soap bubble with appealing to "endogenously-generated stable states." In other words, without appealing to the science of self-organization, it is impossible to explain how the essence of "soap-bubbleness" is *not* constituted by way of an ideal geometric form imposing itself upon an inert collection of molecules from the outside (i.e. hylomorphic schema). Let me use this example to initiate a dialogue with phenomenology. In Maurice Merleau-Ponty's early work, *The Structure of Behavior*, he tries to explain how an organism's preferred mode of behavior is constituted, such that what is experienced as "the simplest" and "most natural" is that mode of

behavior that gives the organism a feeling of balance and facility. Merleau-Ponty writes:

Is the orientation toward these preferred modes of behavior comparable to the formation of a spherical soap bubble? In the latter case, the external forces exerted on the surface of the soap bubble tend to compress it into a point; the pressure of the enclosed air on the other hand demands as large a volume as possible. The spherical solution which is realized represents the only possible solution to this problem of minimum and maximum. Can it be said in the same way that the preferred modes of behavior of an organism are those which, in the *de facto* conditions in which it finds itself, objectively offer the greatest simplicity and the greatest unity?

In his article, "The Current Relevance of Merleau-Ponty's Phenomenology of Embodiment," Hubert Dreyfus claims that Merleau-Ponty responds to this latter query in the affirmative:

The bubble starts as a deformed film. The bits of soap just respond to the local forces according to laws which happen to work so as to dispose the entire system to end up as a sphere, but the spherical result does not play any causal role in producing the bubble. The same holds for the final gestalt of body and racket in my example. Indeed, I cannot represent how I should turn my racket since I do not know what I do when I return the ball. I may once have been told to hold my racket perpendicular to the court, and I may have succeeded in doing so, but now experience has sculpted my swing to the situation in a far more subtle and appropriate way than I could have achieved as a beginner following this rule.

What do you think of the phenomenological appeal to the self-organized process of a soap-bubble in order to explain the relation between perception and skill acquisition? Do you think that this example suggests there may be a richer relationship between phenomenology and Deleuzeian ontology?

De Landa: There have been many people who have tried to come up with some kind of "soap bubble" explanation for aspects of human behavior: the bubble minimizes surface tension, so we "minimize effort" or something like that. This is fine with me as long as it is clear this is just a hypothesis that needs testing. But to assume that there is some "law" that everything in the world must be governed by a "least principle" is wrong. (It assumes the only virtual multiplicities are those characterized by a single steady-state singularity). It very well may be that aspects of the stability of perceptual fields do in fact depend on least principles (or steady-state stability: the famous Necker Cube or the duck-rabbit illusion of Wittgenstein surely indicate our vision can jump from one to another stable state). But now, is there a way of discovering these stable states from within (phenomenologically)? Or do we have to use psychophysics and other disciplines (neural networks, for example, which do use steady states) in order to approach the question? And, at any rate, why only steady states, why not periodic or other singularities? And why a unique one (as in the soap bubble) as opposed to a multiplicity with broken-symmetry levels (to account for the fact that our experience changes if we ingest alcohol, or psychedelics)?

CTHEORY (lhde): I agree. I have long been critical of Merleau-Ponty's interpretation of Necker Cubes vis-à-vis my notion of multistability. Like a number of psychologists, Merleau-Ponty mistakenly thinks that the reversibility of the cube is what is unique about the cube. In my version of phenomenology, the structures of perception are best discovered through variational method; this allows one to investigate the whole range of possibilities from those of ordinary

sediments to the most extreme horizontal possibilities.

CTHEORY (Jensen): A different but related question arises from the fact that even though you take your analysis to be realist, this does not delimit the interpretive flexibility of readers -- that is, their abilities to take your accounts as supporting their specific projects regardless of whether you would approve of that use or not. For instance, in a recent talk at Duke, Žižek invoked your understanding of Deleuze as the only correct one. Nevertheless, my feeling is that his psychoanalytically informed way of evaluating the correctness and plausibility of Deleuzian interpretations, including yours, is something you would vehemently oppose. As you espouse the idea of a "correct understanding," how do you think about and/or handle readers who misunderstand or otherwise misuse your work?

De Landa: Well, it would all have to be handled case by case. As long as Freud can be taken to have given us a process of individuation (via the Oedipal drama) his ideas fit the ontology I propose. A philosopher can only specify that a historical individuation process must be given but not what exactly those processes are (which is a question for the specialists). The part of Freud where he gives an account of personal individuation may be right or wrong in reality, but it is compatible with my ontology. The part where he attempts to define society as a kind of projection from these mental structures violates the ontology: institutional organizations and norms are individuated following another real historical process and are not just mental projections. So that part has to be rejected. A similar treatment would have to be given for each concrete individual entity. Now, to the extent that many proposed processes are compatible with the basic ontology (while they may be incompatible with one another) there can be many interpretations of it. Yet this does not mean any reading will be compatible: I still wonder how a phenomenologist would find my ideas compatible or even useful.

CTHEORY (Protevi): *Intensive Science and Virtual Philosophy* accepts Deleuze's use of axiomatics to analyze major or Royal science. Yet you are critical of Deleuze and Guattari's use of axiomatics as a way to conceptualize capitalism (e.g., *ATY* 331n7), which you see as an example of a top-down positing of a whole. I certainly would agree with you that far too much Marxist work has been simplistic, historical determinist, reductive, totalizing, functionalist, top-down, etc., but I wonder if you aren't being too harsh with Deleuze and Guattari's attempts to define a theory of capitalism that avoids each of these dangers? They certainly adopt a notion of "machinic surplus value," moving beyond a simple labor theory of value (machines as "congealed muscular energy," as you put it at *ATY* 79). Don't they also consistently deny any historical determinism of stages of development by emphasizing the contingency of capitalist formations, as well as conduct a sustained polemic against reductive base-superstructure models of society? Don't their constant reminders that the line of flight is primary prevent any totalizing accounts? Isn't their use of axiomatics an attempt to see capitalism as an adaptive meshwork of economic, state and quasi-state (IMF, WTO, etc.) institutions, rather than as a homeostatic organismic whole, as in crude functionalist accounts? In other words, haven't they, at least in principle, given us the outlines of a bottom-up account of a complex, open-ended, adaptive world capitalist system?

De Landa: I agree that if I had to choose among all the Marxist accounts of economic history I would probably pick theirs. It does have all the advantages you mention. Yet, I believe they would have benefited greatly from a better reading of Braudel. They seemed to have read only volume one of his history of capitalism and not the other two volumes, which are really the most radical part. This is clear when in *A Thousand Plateaus* in one page they quote Braudel's stress on the role of cities and yet in the very next page Deleuze and Guattari go on to define capitalism as a "market economy", an idea which Braudel attacks as historically false. So I

wonder what would have happened to their theory had they understood the last point: that there is no such thing as "the market" in general and no such thing as a "logic of exchange" in general (doesn't the idea of an capitalist axiomatic depend on the idea of a logic of exchange?). Once we separate oligopolies from the market (they are strategic not primarily exchangeist entities) and identify capitalism with oligopolies (as Braudel does) we can still use some of Deleuze and Guattari's ideas since markets have always caused "lines of flight" to pass among societies, particularly closed societies (it's in the marketplace that we meet outsiders; that foreign objects and ideas enter a city; that heterogeneity is injected etc).

CTHEORY (Protevi): Yes, you're completely right that Deleuze and Guattari overlook Braudel's distinction between market and anti-market and use an abstract sense of capitalism as a "market economy" whereby "market" means "any exchange system whatsoever, whether it is composed of atomic producers and consumers who must act as price-takers (the Braudelian sense of 'local market') or whether it is composed of producers and consumers with varying degrees of power to be price-setters (the Braudelian sense of 'anti-markets')." Even though it's sometimes hard to make that distinction clearly all the time (for instance, when you say in your answer "it's in the marketplace that we meet outsiders; that foreign objects and ideas enter a city" I think Braudel would attribute this to long-distance trade dominated by anti-market corporations, even if it occurs in the same physical location as local market exchanges), I agree we should by all means incorporate that distinction into our analysis of the economies (note the plural) operating today worldwide. Here the neo-Marxist notions of formal and real subsumption (roughly speaking, the relations between capitalist and non-capitalist economies, and the tendency of the former to replace the latter) would have to be brought to bear, notions that Hardt and Negri use often in *Empire*. (Just to be clear before I continue: I completely agree with you in everything you say about Marx himself in the 19th century being wed to equilibrium analyses, about the complete bankruptcy of top-down and centralized social and economic planning, about the necessity of using non-linear analyses of economic processes that show the inadequacy of equilibrium and optimizing models, and so forth.)

Here is my question to you: I wonder if Deleuze and Guattari ignore the Braudelian distinction because, like Marx, they locate the important element to be examined in capitalism to be production rather than exchange? Recapitulating what they say in both *Anti-Oedipus* and *A Thousand Plateaus*, what they call in *What is Philosophy?* "Marx's concept of capitalism" (97) is the conjunction of the deterritorialized flows of labor and capital, and these meet in production, not in exchange.

De Landa: Well, no, not really. I agree that the dichotomy "market/antimarket" does give that impression, hence I probably won't use it again. But the same distinction applies to production: it's the difference between economies of scale and economies of agglomeration. That is, between oligopolies using managed prices, routinized labor, hierarchical structure, vertical integration etc. and networks of small producers using market prices, skilled labor, decentralized structure and functional complementarities. You must remember the study that compares Silicon Valley and Route 128 as production systems (mentioned in *A Thousand Years of Nonlinear History*) or what I have written about Emilia-Romagna. Braudel (and Jane Jacobs following in his steps) places a great emphasis on this distinction (though he does not use the terms) and views it as applying across history for at least a millennium (hence economies of agglomeration would not be a late stage of capitalism as some Marxists have tried to argue using the term "flexible specialization" or the ridiculous one of "post-Fordism") but an alternative to economies of scale (also much older than the Industrial Revolution) which has been there for a while.

CTHEORY (Protevi): What about the emphasis on production as the key ontological concept in

Anti-Oedipus (the whole world, nature and humans together, is composed of interlocking series of connected machines that produce materials that are fed into other machines)?

De Landa: This is correct. I myself add to this when I attack the Humean notion of causality (as perceived constant conjunction) and define it as a real connection in which one event *produces* another event. And more generally, when I stress that to get rid of essences one must always give the intensive process of production that yields any individual entity (atoms, organisms or commodities). Intensive thinking in general is about production.

CTHEORY (Protevi): From this productivist perspective (which I think is amenable to a nonlinear dynamics analysis of the material and energy flows that keep the open production systems far-from-equilibrium), the key issue is the productive conjunction of capital and labor (here machinic surplus value vitiates a pure labor theory of value), whether or not the products of that labor flow into markets or anti-markets. And the key to coercing labor into exploitative production processes is to threaten the production of labor power with interruption of the flows that sustain it.

De Landa: Well, but the same point applies here: the conjunction of capital and labor can take place in different forms (scale, agglomeration) and it is clear that only the economic power of the former allows the kind of threat of withdrawal you are talking about: only if a firm is very capital intensive (large machines, large start-up costs functioning as barriers to entry) and if the process is based on routinization (the less skills a worker brings the less bargaining power he/she will have when it comes to set wages) can this form of coercion work. I am not saying that power relations are absent from networks of small producers but there the ability of workers to bargain for a fair wage (particularly if unions exist) is much greater and the permeability of the division between classes is greater too (if a typical firm has less than 100 employees and it is not capital intensive, it's much easier for a motivated, creative worker to start his/her own business). The point is that all of this is obscured (if not made invisible) by the blanket concept of "capitalism."

As to theories of value: we need to go beyond the very notion of surplus value. (It's not enough to simply add the "machinic" type to escape the labor theory). Why just adding machines to "abstract labor" (read, routinized labor)? Why not also fossil fuels, starting with coal? And what of knowledge, skills and organizational procedures? And then, the main defect of labor theory here is to include supply factors and not demand factors, but the latter also matter, and so marginalist approaches to this side of the equation must be added. (Over the objections of Marxists who would rather die than include bourgeois marginalism in a theory of value).

CTHEORY (Protevi): Okay, but even if the shift from an exchangist to a productivist perspective doesn't work for you, does it at least seem to you a fruitful way of explaining Deleuze and Guattari's tenacious loyalty to (some suitably modified) form of Marxist analysis, as well as their insistence on a systematicity to capitalist production? Or do we have to change so much in Marx to reach what Deleuze and Guattari say in analyzing things that their insistence on calling what they do a form of Marxism simply the result of their social position in the "gauchiste" (non-Communist) left of France in their lifetimes? In other words, their Marxism is a way of thumbing their noses both at neo-liberals and at party loyalists?

De Landa: Well, frankly, I think Marxism is Deleuze and Guattari's little Oedipus, the small piece of territory they must keep to come back at night after a wild day of deterritorializing. Who could blame them for needing a resting place, a familiar place with all the reassurances of the Marxist tradition (and its powerful iconography of martyrs and revolutionaries)? The question is whether

we need that same resting place (clearly we need one, but should it be the same? Shouldn't each of us have a different one so that collectively we can eliminate them?).

I believe that the main task for today's left is to create a new political economy (the resources are all there: Max Weber, T.B. Veblen and the old institutionalists, John Kenneth Galbraith, Fernand Braudel, some of the new institutionalists, like Douglass North; redefinitions of the market, like those of Herbert Simon etc) based as you acknowledged before, on a non-equilibrium view of the matter? But how can we do this if we continue to believe that Marxists got it right, that it is just a matter of tinkering with the basic ideas? At any rate, concepts like "mode of production" do not fit a flat ontology of individuals as far as I can tell. But then, this is the part of my reconstruction of Deleuze that I am the least sure he would accept: in *Difference and Repetition* he cheerfully talks about the "virtual multiplicity of society" (using Marx as his example, of course) a term I would never use (since my ontology explicitly rejects totalities like "society as a whole").

CTHEORY (Mallavarapu): In your new book *Intensive Science and Virtual Philosophy*, you point out Deleuze's relevance not just to continental philosophy but to analytical philosophy as well. There have been significant differences between continental and analytical approaches to fundamental epistemological questions. This has formed the background to the so-called "Science Wars" debates between the realists and social constructivists. Does the Deleuzian concept of materiality offer a way out of the Science War debates?

De Landa: Absolutely. You have to remember that constructivists have more in common with scientists (who are positivists, not realists) than with realists. Larry Laudan has explored the ways in which relativism (of any type) overlaps with positivism. Both make heavy use of conventions; both ignore mathematics and focus on language etc. Deleuze offers an alternative to both of them, and in my view, allows us to rescue the objectivity of science without accepting the myth of its achievements. (For example, we can accept that classical physics did get it right, within a limited sphere of reality, but not that it discovered the eternal laws of the universe).

CTHEORY (Jensen): Finally, a question about your way of reading Deleuze about which it could be argued, rightly, I think, that it is highly selective. Deleuze, of course, wrote at great length about Kafka, Proust, and numerous other writers. He also wrote two books on cinema. And he has been received with considerably more interest in American literature departments than in their philosophical counterparts. But to you Deleuze's discussions of self-organization, the differential calculus, morphogenesis, and other scientific concepts and ideas have been much more consequential than his invocation of artistic ones. Can you elaborate on your way of reading Deleuze and its almost unilateral stress on aspects of his works relating to the natural sciences rather than the arts? How do you think these aspects hang together? And, finally, could it not be argued that your systematic selectivity is imposing on the Deleuzian corpus an interpretation, which not only could but *effectively would* have been quite different if other aspects of his work had been emphasized at the expense of those of your preference?

De Landa: I agree that my reading of Deleuze is highly selective. The idea was: once we know how his world works (a virtual space becoming actual via intensive processes) aren't we in a much better position to understand the other parts? For example, in the theory of memory he takes from Bergson, one does not retrieve a memory trace from the brain, one literally jumps to another space (the virtual with its own always-past temporality). Now, without a realist ontology this would be a useless theory (if there is no virtual space where do we jump to?). But isn't it the same with his other uses of Bergson (e.g. in the Cinema books)? Or take for example his affirmation that all great art involves a becoming-animal of one sort or another. What would this

mean if we cannot say what in reality these becomings are? (They are transformations not of organisms, like werewolves, but of the virtual multiplicities underlying the organisms). Or take the line of flight (also called the quasi-causal operator): this is the entity that builds the plane of consistency out of multiplicities. But without this definition (and the rest of the ontology) could we understand what it means to follow a line of flight in painting or music?

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Bibliography

Braudel, Fernand. *On History*, trans. Sarah Matthews (Chicago: University of Chicago, 1982).

Braudel, Fernand. *The Perspective of the World: Civilization and Capitalism 15th-18th Century*, trans. Sian Reynolds (University of California Press, 1992).

Braudel, Fernand. *A History of Civilizations*, (New York: Penguin, 1995).

- De Landa, Manuel. *War in the Age of Intelligent Machines* (New York: Zone Books, 1991).
- De Landa, Manuel. *A Thousand Years of Non-Linear History* (New York: Zone Books, 1997).
- De Landa, Manuel. *Intensive Science and Virtual Philosophy* (New York: Continuum, 2002).
- De Landa, Manuel. "Markets, Anti-Markets, and Network Economics."
<http://www.telefonica.es/fat/edelanda.html#delandapaper>
- Deleuze, Gilles. *Cinema I: The Movement Image*, trans. Hugh Tomlinson and Barbara Habberjam (Minneapolis: University of Minnesota Press, 1986).
- Deleuze, Gilles. *Foucault*, trans. Sean Hand (Minneapolis: University of Minnesota Press, 1988).
- Deleuze, Gilles. *Cinema II: The Time Image*, trans. Hugh Tomlinson and Barbara Habberjam (Minneapolis: University of Minnesota Press, 1989).
- Deleuze, Gilles. *The Logic of Sense*, trans. Mark Lester with Charles Stivale (New York: Columbia University Press, 1990).
- Deleuze, Gilles. *Difference and Repetition*, trans. Paul Patton (New York: Columbia University Press, 1994).
- Deleuze, Gilles and Guattari, Félix. *Kafka: For a Minor Literature*, trans. Dana Polan (Minneapolis: University of Minnesota Press, 1986).
- Deleuze, Gilles and Guattari, Félix. *A Thousand Plateaus*, trans. Brian Massumi (Minneapolis: University of Minnesota Press, 1987).
- Deleuze, Gilles and Guattari, Félix. *What is Philosophy?*, trans. Hugh Tomlinson and Graham Burchell (New York: Columbia University Press, 1994).
- Dreyfus, Hubert. "The Current Relevance of Merleau-Ponty's Phenomenology of Embodiment." *The Electronic Journal of Analytic Philosophy* 4: Spring 1996.
- Hacking, Ian. *Representing and Intervening* (Cambridge: Cambridge University Press, 1983).
- Hacking, Ian. *The Social Construction of What?* (Cambridge: Harvard University Press, 1999).
- Hardt, Michael and Negri, Antonio. *Empire* (Cambridge: Harvard University Press, 2000).
- Hesse, Mary. *Revolutions and Reconstructions in the Philosophy of Science* (Bloomington: Indiana University Press, 1980).
- Ihde, Don. *Technology and the Lifeworld*. (Bloomington: Indiana University Press, 1990).
- Ihde, Don. *Instrumental Realism* (Bloomington: Indiana University Press, 1991).
- Ihde, Don. *Expanding Hermeneutics: Visualism in Science* (Evanston: Northwestern University Press, 1998).
- Ihde, Don. *Bodies in Technology* (Minneapolis: University of Minnesota Press, 2002).

Ihde, Don and Selinger, Evan. *Chasing Technoscience: Matrix for Materiality*. (Bloomington: Indiana University Press, 2003).

Latour, Bruno. *Science in Action*. (Cambridge: Harvard University Press, 1987).

Latour, Bruno. *The Pasteurization of France* (Cambridge: Harvard University Press, 1998).

Latour, Bruno. *We Have Never Been Modern*, trans. Catherine Porter (Cambridge: Harvard University Press, 1993).

Latour, Bruno. *Pandora's Hope: Essays on the Reality of Science Studies* (Cambridge: Harvard University Press, 1999).

Latour, Bruno. *War of the Worlds: What About Peace?* (Chicago: University of Chicago Press, 2002).

Latour, Bruno and Weibel, Peter. *Iconoclasm: Beyond the Image Wars in Science, Religion, and Art* (Cambridge, MIT Press, 2002)

Merleau-Ponty, Maurice. *Phenomenology of Perception*, trans. Colin Smith. (London: Routledge & Kegan Paul, 1962).

Merleau-Ponty, Maurice. *The Structure of Behavior*, trans. A.L. Fisher (Boston: Beacon University Press, 1967).

Pickering, Andrew. *The Mangle of Practice: Time, Agency, and Science*. (Chicago: University of Chicago Press, 1995).

Pickering, Andrew. "In the Thick of Things." Keynote address, conference on "Taking Nature Seriously: Citizens, Science, and Environment," University of Oregon, Eugene, 25-27 Feb 2001.

Protevi, John. *Political Physics* (New York: Athlone Press, 2001).

Wolfram, Stephen. *A New Kind of Science* (Champaign: Wolfram Media Inc., 2002).

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